

VIDEO AND DATA SWITCHING SYSTEMS

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SWITCHING MATRICES AND RELAYS

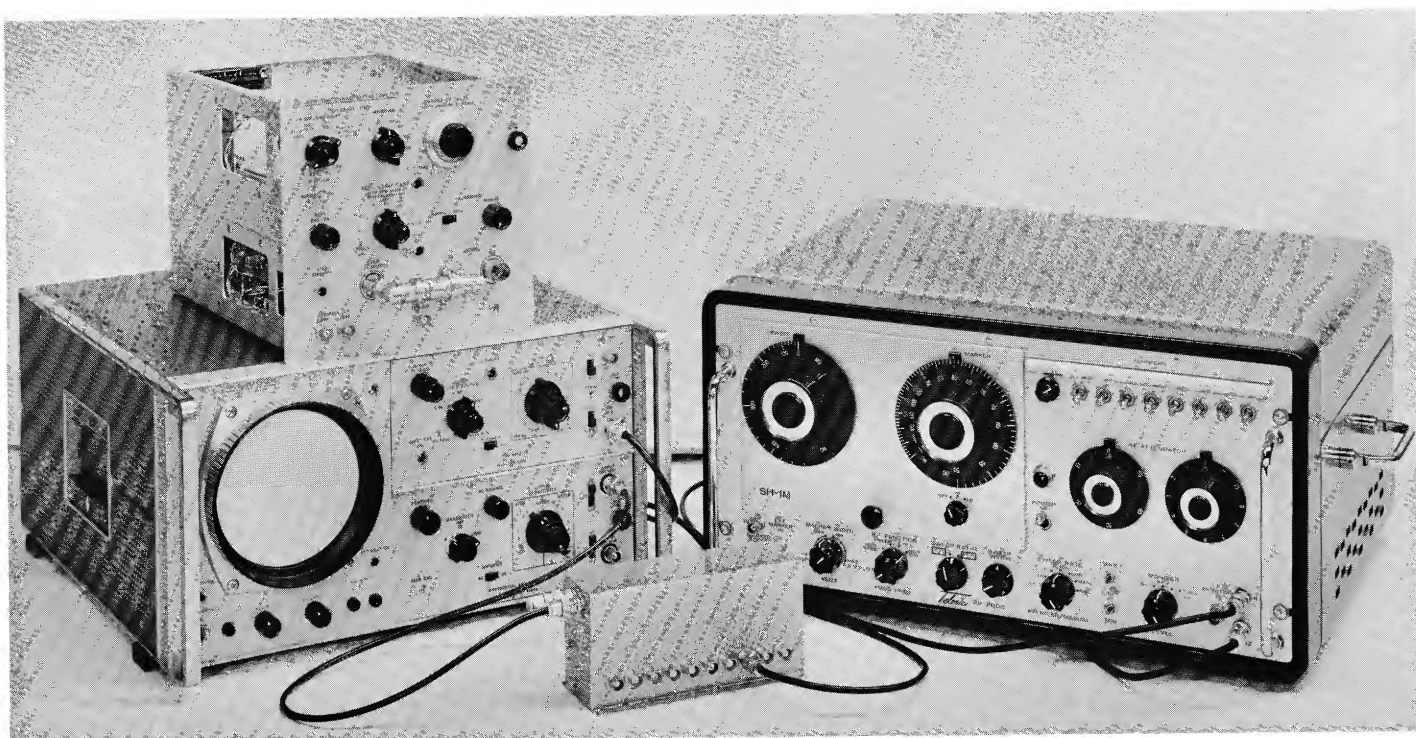
Gentlemen:

The following pages are being sent to assist you in determining the applicability of our products with regard to your requirements.

We are in the process of finalizing a new catalog to more completely describe these products and are adding your name to the mailing list.

Thank you for your interest.

E. Trompeter
President



MATRIX UNDER TEST

INTRODUCTION

VIDEO AND DATA SWITCHING SYSTEMS

RF, video and data handling systems are presently configured using manual patching or programmed patch panels for such applications as analog, digital, TV video, telemetry, computer, IF, HF and VHF transfer functions. This includes sine wave frequencies from zero cycles to 100 megacycles and fast rise time pulses for high megabit data systems. These signals are normally carried over shielded wire, coax or twisted pair shielded (twinax) cable systems.

The switching systems presented here are a new concept designed to replace manual patching or programmed patch panels with remote controllable matrices or multiple switching units for transferring low level low frequency (audio, digital or analog) and high frequency (video, IF and RF) signals.

Listed below are a few of the typical applications where matrix or multiple switching can be applied:

- Industrial applications using telemetry and signaling functions for remote measurement and control.
 - fire, police and industrial security systems
 - intercom and voice transmission systems
 - remote fluid level, temperature, radiation measurement systems
- Missile and aerospace telemetry, data acquisition and data handling.
 - receiver video output to discriminator switching
 - predetection record and playback switching
 - 7 and 14 track video tape signal control for record and playback
 - receiver I.F. strip or local oscillator switching
 - oscillograph and galvanometer switching for shielded wire or balanced line (twinax)
 - test stand remote transducer sampling and switching

- Broadcast and Closed Circuit TV
 - medium speed (1 millisecond) audio and video switching
- Analog and digital computer
 - medium speed interface switching and tape formatting
- HF and VHF Antenna Switching to 100 mc.
 - single or multiple receiver switching to multiple antennas

The matrices or multiple switching units are actuated by any d.c. voltage between 12 and 48 volts and can be remotely controlled by a simple toggle or lighted push switch panel, pre-programmed punched card or wired panel, running punched tape, long distance telephone lines, or computer controlled for automatic checkout applications. This will allow quick, accurate and repeated test set ups without the necessity for making and breaking patch connections by operator personnel.

The switching systems are packaged in 2 modes, matrices and multiple switching units, matrices having the ability to connect any input to any output singular or plural, while multiple switches are a multi pole-multi throw configuration in one compact package. Both are manufactured for switching wire, coax and twinax cable systems in various configurations of size, electrical characteristics and job function. Additionally, special versions are available that have loading or terminating features and extra contacts for remote indication.

● MATRICES

The matrices presented here are switching mechanisms wherein any input can be connected to any output and are available to customer order in either the single (X,Y) plane or the three dimensional format (X,Y,Z) plane, from simple 1X2 versions to a maximum configuration of 400 crosspoints. Typical configurations are 1X2 (Fig. 6), 1X10 (Fig. 7), 2X10 (Fig. 1), 7X7 (Fig. 10), 10X10 (Fig. 9), 7X14 and 20X20 units which are usable for switching and programming with numerous paths through the matrix being available simultaneously.

A specially configured 3 plane matrix (X,Y,Z) is also available wherein any input is capable of being connected to any 2 other connections in different planes. In effect, each crosspoint is a single pole double throw relay and is used to provide extreme flexibility in 3 circuit systems (Fig. 12).

Electrical characteristics are as listed below:

- Crosstalk (adjacent lines) is 110 db minimum for all versions.
- Isolation (open crosspoint) is as listed below:

<u>TYPE</u>	<u>VERSION</u>	<u>MINIMUM ISOLATION (Open Crosspoint) MEASURED AT 60 MC.</u>
A	LOW ISOLATION	45 db - Wire, Coax and Twinax
V	MEDIUM ISOLATION	70 db - Coax and Twinax
R	HIGH ISOLATION	110 db - Coax and Twinax

● GENERAL SPECIFICATIONS

INSERTION LOSS:	0.2 db at 60 mc. (Maximum)
MAXIMUM SWITCHED SIGNAL CURRENT:	0.5 amp non inductive
CONTROL VOLTAGE:	12 to 48 volts dc.
CONTROL CURRENT:	1 milliamp per volt per crosspoint
VSWR:	1.25:1 at 20 mc. maximum
ACTUATION TIME:	1 millisecond, maximum
SIGNAL CONNECTORS:	BNC (Coax), Twinax (Video Pair) Other types available on special order.
LIFE EXPECTANCY:	20 million closures per contact at full rated current, 100 million for dry circuit switching.

POWER MATING CONNECTORS ARE FURNISHED WITH EACH UNIT.

● MULTIPLE SWITCHES

Using the same components as designed into the matrix relays, multi pole multi throw coax and twinax relays are available for the same areas of application as the matrix. In effect, they are a number of single input matrices in one box, ie: five 1X10 matrices makes up into a 5 pole 10 throw relay. Units can be made up to a maximum of 400 points or 20 pole 20 throw. Typically supplied units are:

- a) 7 pole 2 throw coax relay for the switching of 7 track tape recorders as one recorder turns off and the second recorder starts, Type CSA7X2C (Fig. 13).
- b) 5 pole 5 throw coax relay used to switch data lines from 5 control rooms to 5 computation centers, Type CSA5X5C.
- c) 1 pole 28 throw coax relay used for sequencing or stepping application, Type CSA1X28A. (Fig. 16)
- d) 5 pole 10 throw twinax relay used for transferring video pair or balanced two wire lines between transmitting and receiving locations, Type TSA5X10C.
- e) 1 pole 10 throw wire relay used for sampling of D.C. voltages in signaling or alarm circuits, Type WSA1X10A.

In order to provide complete flexibility, different levels of isolation are available, as in the matrix, and are similarly designated.

● ENGINEERING CONSIDERATIONS

The switches and matrices are usable with no degradation of VSWR at frequencies up to 20 mc. For frequencies above 20 mc., the VSWR is a function of frequency used, size and configuration of the particular unit chosen. As an example, tests performed on a 7X7 matrix at 136 mc. indicate a maximum VSWR of 1.8:1. Tests performed on a 3X3 matrix at 250 mc. indicate a maximum VSWR of 1.5:1. Isolation and crosstalk are essentially independent of frequency to higher than 250 mc.

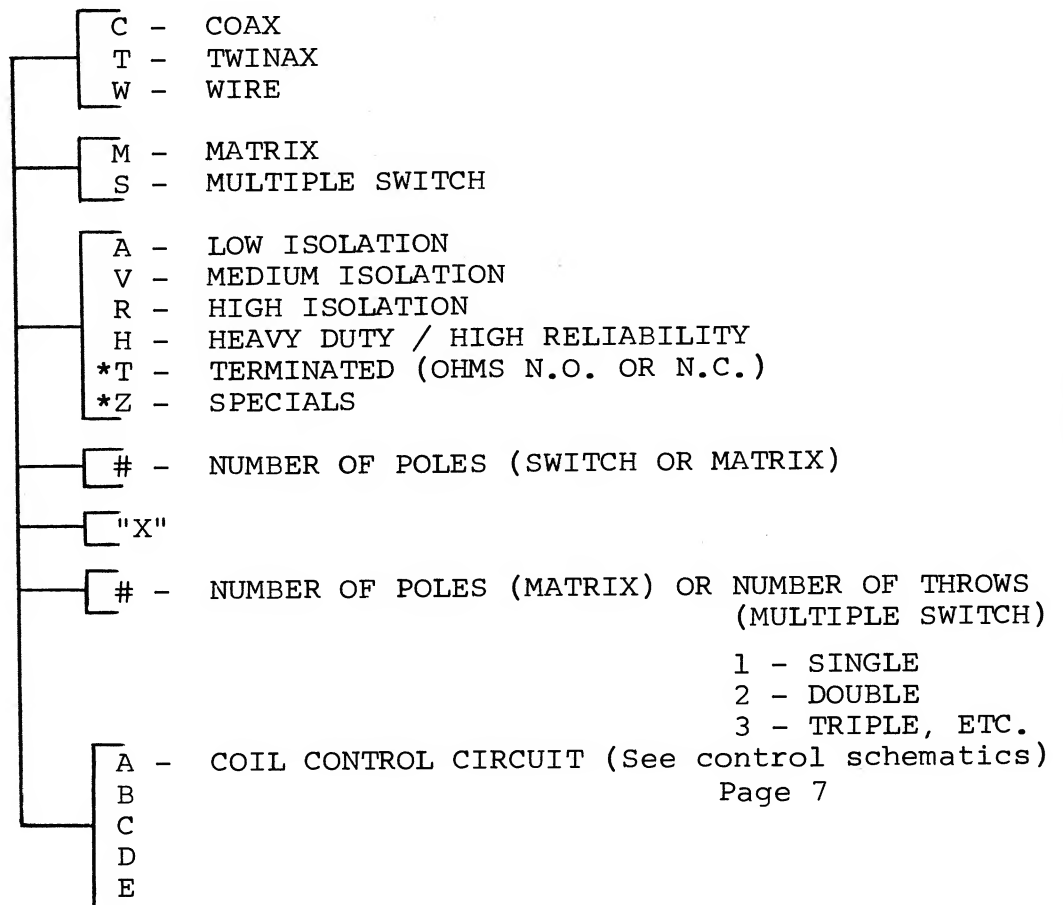
Contact our engineering department for definitive performance characteristics on any particular unit or application.

● SPECIAL ORDERS

- DIFFERENT CONTROL VOLTAGE METHODS CAN BE SUPPLIED WHERE ISOLATED GROUND, INDIVIDUALLY ISOLATED, OR ANY COMBINATION OF CONTROLS ARE REQUIRED. (SEE CONTROL CIRCUITRY DESIGNATIONS PAGE 7.)
- MATRICES WITH LESS THAN THE FULL NUMBER OF CROSSPOINTS OFFER COST SAVINGS TO THE CUSTOMER. NON REQUIRED CROSSPOINTS CAN BE ELIMINATED AT TIME OF MANUFACTURE TO GREATLY REDUCE THE COST.
- A SPECIAL VERSION CAN BE SUPPLIED WHERE THE COAX OUTER CONDUCTOR IS TO BE KEPT ISOLATED FROM COMMON GROUND AND TO BE SWITCHED ALONG WITH THE CENTER CONDUCTOR.
- EXTRA RELAY CONTACTS OUTSIDE THE SIGNAL CIRCUITS MAY BE ADDED FOR REMOTE INDICATOR OR DISPLAY PURPOSES.
- IN BOTH THE MATRIX AND MULTIPLE SWITCH FORMAT AN AUTOMATICALLY TERMINATING UNIT IS AVAILABLE. THIS FEATURE PROVIDES TERMINATION OF THE LINE IN ANY RESISTANCE DESIGNATED BY THE CUSTOMER AND CAPABLE OF HANDLING UP TO ONE WATT OF POWER.
- FOR SWITCHING OF DC OR LOW FREQUENCY ANALOG, DIGITAL AND AUDIO VOLTAGES, MATRICES AND MULTIPLE SWITCHES ARE AVAILABLE WITH MULTI PIN CONNECTORS OR SOLDER TERMINALS FOR USE IN SINGLE WIRE OR 2 WIRE BALANCED SYSTEMS.
- CONTROL PANELS WITH LIGHTED PUSH BUTTONS CAN BE SUPPLIED FOR THE REMOTE CONTROL OF THE PROCURED MATRIX OR SWITCH (FIG. 15).
- ALL UNITS CAN BE SUPPLIED IN A DIFFERENTIAL (OR LATCHING) CONFIGURATION.

PRICING -- DUE TO THE UNLIMITED VARIATIONS AND VERSIONS AVAILABLE, PRICING CAN ONLY BE SUPPLIED BY CONTACTING OUR SALES DEPARTMENT. PLEASE KEEP IN MIND THAT HIGHER ISOLATION AND SPECIAL FEATURES ALL ADD TO THE END COST.

● TYPE NUMBER DESIGNATION



 (Added designations for special versions)

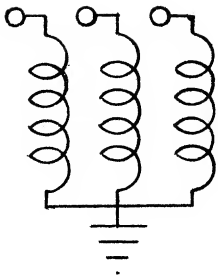
- 1 REMOTE INDICATING CONTACT CIRCUIT (See control schematics)
- 2
- 3 Page 7
- / Number of actual crosspoints in matrix if less than full box. Must have list of crosspoints.

*Terminated and special versions must be accompanied by technical description of desired features.

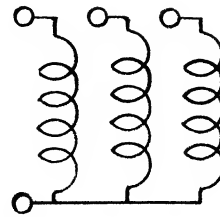
SAMPLES:

- a) 10 by 10 coax matrix, medium isolation, grounded independent control=CMV10X10A (Fig. 9)
- b) 7 pole, three throw coax multiple switch, low isolation=CSA7X3C (Fig. 14)
- c) 7 pole, single throw twinax multiple switch with 124 ohm normally closed termination=TST7X1C/124 ohm normal closed
- d) 1 by 10 coax matrix, high isolation, grounded independent control, with remote indicating contacts=CMR1X10A-2 (Fig. 7)
- e) 1 by 6 twinax matrix, low isolation, grounded independent control=TMALX6A (Fig. 8)
- f) 3 dimensional (X,Y,Z) coax matrix 4X4X4, low isolation, independent control=CMA4X4X4A (Fig. 12)

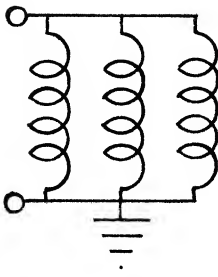
● COIL CONTROL AND REMOTE CONTACT
CIRCUIT CONFIGURATIONS AVAILABLE



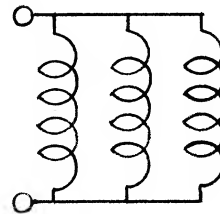
"A" Independent Control
Common Ground



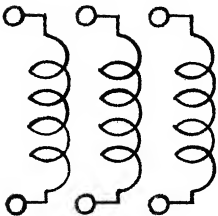
"B" Independent Control
Isolated Common



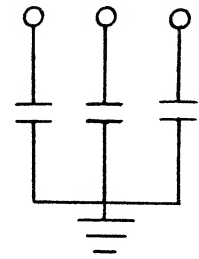
"C" Common Control
Grounded



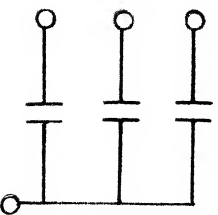
"D" Common Control
Ungrounded



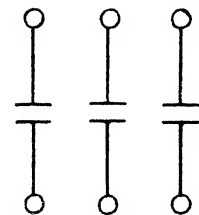
"E" Independent Control
No Common



"-1" Remote Contacts
Common Grounded



"-2" Remote Contacts
Common Ungrounded



"-3" Remote Contacts
No Common

